AMERICAN DYESTUFF REPORTER

A Weekly Publication devoted to

DYESTUFFS, COLORS and ALLIED CHEMICALS

Circulating Wherever Dyestuffs are Used

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Dyestuff Irregularities

Consumers of dyestuffs no longer show reluctance in the use of American made dyes, but despite their efforts to encourage the new industry have many trials that tax their loyalty severely. It is very difficult to obtain a constant supply of absolutely uniform products. Sometimes the shade varies, sometimes the strength and often the solubility. Having lately passed through a series of transactions with the vampires of the dye trade—the gyps of the past years, they are at times inclined to accuse their supply houses of practicing the same tactics. We feel that this is unfair and the consumer should understand some of the reasons for the lack of uniformity and help to relieve the situation by being as considerate as possible.

It hardly needs to be re-stated that throughout the country everything is hurry and bustle, that is, until the railroad is reached. After the shipment is made the winds of chance are not more fickle.

Since raw materials are the most bulky and least expensive, they are naturally the ones that suffer most.

In the early days of the war it was possible to obtain the raw materials in a state of absolute chemical purity. To-day a strictly chemically pure raw material is almost a rarity, when bought on the open market, and many of the deliveries on contracts fall below the absolute standard. In ordinary matters, materials a few per cent below standard are not objectionable and an allowance can usually be made by way of adjustment. In organic chemistry, however, the presence of an impurity may give rise to a series of objectionable by-products that cannot easily be separated, and by the time the manufacture of an intermediate has gone through several stages the contamination has reached a considerable quantity. If this state of affairs would remain constant a proper allowance could be made and a system of purification devised at some stage of the manufacture.

Unfortunately the delivery which was expected may be tied up in a freight yard, somewhere in America, and the supply necessary to keep the factory in operation must be purchased from another source. Usually this other source is a spot offering of a broker who can make quick delivery. The result is that a new impurity is probably present and the final product is now wrong again, but in a different way.

Theoretically all the materials can be purified, but practically our new dye chemists are trying to make several colors, their intermediates, and tend to a number of things instead of concentrating on one.

Uniform finished dyestuffs are only possible when made from uniform intermediate products, and these require even more skill and purer raw materials than the dyes themselves. Before the war we could make excellent dyes in this country from imported intermediates, but to-day we are producing all the steps from the crude tar to the finished dyes.

We dislike to hear the sneer that accompanies the statement that "Germany certainly produced the best chemists." There is no use explaining here how ten chemists covered the tasks that are expected in America from one or how a man working along one line all his life

FOR FORTY-FIVE YEARS

LEADING distributors of Chemicals, Colors, Dyestuffs, Gums and Oils to the Textile Industry.

From time to time, we are receiving dependable shipments of ACID, BASIC, DIRECT, SULPHUR and "CIBA" FAST VAT DYES, and offer these in reasonable quantities.

Correspondence invited

A. KLIPSTEIN & COMPANY

644-652 GREENWICH STREET NEW YORK CITY

would naturally learn a few things that would make him a leader in this one line. When a person has an opportunity to slowly study an industry over a period of forty years it is unreasonable to expect a novice, crowded with many responsibilities, and under obligation to turn out a stipulated tonnage, to equal the record in three years' time.

You all know America's record in the line of invention, and yet the record of America's chemical achievements is generally forgotten just because we did very little in dye invention before the war. We did little because the American dye chemist was looked upon as a joke. The factories that were running were manned by the hyphenated variety of American who would only allow those of their own race in the buildings. None of the colleges or universities taught or could teach anything but the mere rudiments of dye making, so it is no wonder that we made no progress along those lines.

The achievements of to-day are great, and if it were generally known what obstacles have been overcome the daily press would make news features of them.

In any other line of industry a steady uniform supply of raw materials and tools are necessary to maintain a constant output of a uniform product, and dye manufacture is no exception.

To expect a well-trained chemist with inventive ability, alert mind and inexhaustible energy to do as well as the Germans did before the war, is like expecting a billiard expert to equal the record with three china eggs.

Between the freight congestion, the quality of raw materials and the commandeering of supplies by the Government, the task of maintaining uniformity is not easy.

We suggest that consumers suspend judgment and give the new dye makers the benefit of the doubt for the time being. There are many ways by which they can learn the quality of the goods, and if a slight adjustment of working formula will permit them to use a certain lot, it is far better for the national welfare than to throw it back on the manufacturer.

In the meantime the dyestuff makers and dealers are taking steps toward a system of standardization which shall be just and fair to all, and it is hoped that by concerted effort it will be possible to straighten out some of the tangles and greatly improve relations between producer and consumer.

Standardizing Clothing and Limiting the Use of Many Fabrics

Fancy Stripes and Colors to be Barred

Washington, December 30.—To release labor and materials for war work, reduce the cost of living and free large sums for investment in war bonds and thrift stamps, the committee on commercial economies of the War Industries Board is mapping out a radical scheme for standardizing clothing and the fabrics that enter therein.

If the present plan becomes effective there will be in the near future:

But three colors in shoes—black and two shades of tan.

No more high shoes of the style prevailing the last few seasons. Instead, the standard summer shoe will be the Oxford, or low cut, and the winter shoe for men and women will be of medium cut, extending just above the ankle.

But three colors in men's fabrics—black, a gray and an indigo blue.

But one grade of silk—a fabric to sell at about 60 cents a yard in standard colors yet to be decided upon. The committee has found that a wearable silk of good quality can be manufactured at this price. England is using a similar plan.

Standard neckwear for men, styles and colors to be limited. Now there are scores of styles and thousands of colors and styles of fabric.

No more fancy shirts for men. Instead, standard weaves, limited in number.

Standard cuts and styles of clothes for men.

Standard candies, instead of the innumerable assortments now made and sold in limited number.

The investigations of the committee show that, by standardizing these and other products of common use, the labor supply of the country will be increased not less than 10 per cent, while the saving in materials will run into the tens of millions, and at the same time greatly

relieve pressure on industries needed at full capacity on war work.

The making of colored shirts, for example, is said to require an immense amount of dyestuffs and other chemicals needed in war. The same is true of colored shoes.

The standardizing of styles and fabrics, the committee believes, will be a material contribution toward reducing the high cost of living, first by reducing the cost of manufacture, and secondly, by forcing the elimination of substitutes and adulterations, which cost the consuming public uncounted millions. Thus, in the matter of shoes, a great many of the fancy articles now sold at prices undreamed of a few years ago, contain less real leather than one would find in a child's shoe of a few years ago.

The plan to standardize candy manufacture is considered an answer to those who would stop candy manufacture altogether because of the sugar shortage. The committee believes the people need sweets—that has been the experience of all of the countries at war. But the committee sees no reason for forty kinds of chocolates, or a dozen kinds of lemon drops.—*Tribune.*

Status of Dye Industry and Cotton Dyeing

(*Continued from last issue*)

I desire to show you that you should place your trust more in the manufacturers who have been continually bringing their products to the highest possible standard of quality and producing materials here superior in every way to those manufactured abroad of the same kind. There have been natural dyestuff plants in Great Britain, France, Germany, Switzerland and Italy long before the war, yet our foreign business steadily expanded for the sole reason that the United States made better natural dyestuffs than these other countries did, and if they did send over anilines and fiercely endeavor to wrest every trace of the dyestuff industry away from us in their unholy desire to keep up the manufacture of munitions of war at any cost, yet nevertheless in spite of this and the lack of any adequate tariff protection we held our own and annually increased our outputs.

Natural Dyes Stimulated

Have we American makers of natural dyestuffs been content with our products, or content to feebly imitate our foreign competitors or whine because the foreign patents on certain materials kept us from imitating other men's brains through our lack of them? Not much! Why the very shortage of foreign colors has been the greatest stimulus to the United States manufacturers possible, and I am exceedingly glad to announce that without consulting any of the famous press bureau experts in order to ask for a certificate of merit we have developed a method of manufacture of dyewood extracts for dyeing cotton and union goods, and this includes cotton and wool, cotton and silk, and ordinary shoddy, that will be revolutionary in its relation to the dyeing industry. This actually means that we have at last been able to produce upon a preliminary scale

DICKS, DAVID CO., INC.

Manufacturers

Methyl Violets, Fuchsine and Soluble Blue

302 Broadway, N. Y.

Works: Newark, N. J. Chicago Heights, Ill.

Agents for Essex Aniline Co.

a method of dyeing for natural colors, which was very largely the only particular advantage that the majority of the artificial colors enjoy, and as soon as we have developed this upon the large scale and are ready to place it upon the market we shall bring it most vigorously and prominently to your attention through the recognized publicity channels.

(*This article appeared in a recent issue of the "Textile World Journal."*)

INQUIRY DEPARTMENT

In the establishment of this department it is our desire to help the consumer in buying his products direct from the manufacturer or reliable dealer. Accordingly all questions relative to source of supply will be answered to the best of our ability in an impartial way.

Furthermore, we propose to help in any difficulties that consumers may be having with dyes and chemical products providing that questions do not involve simply tests, which can be readily obtained from those who specialize in such work.

We hope that the consumer will not hesitate in making use of the department, for all questions relative to processes, etc., will receive the personal attention of a chemist who is fully qualified to handle the subject.

Mordant Dye Grouping

Question—Some chrome colors work as well on a chrome mordant as when dyed from an acid bath and after chromed, but this does not seem to be a general rule. Can you give an explanation?

Answer—For a dye to be a mordant dye it is necessary to have a certain grouping of its molecules. There must be two —O—H groups in the Ortho position, then it will combine with a chrome mordant and form an insoluble compound in the fibre during boiling. Some dyes like Alizarine or chrome yellow and the true Alizarines have such a group. The yellows and some reds will dye with acid or on chrome while the Alizarines dye only on the mordant. The other class, however, require to be oxidized before the —O—H groups are set free. In their first condition they are only acid dyestuffs but the after-chroming both oxidizes and mordants them and produces both a change in color and fastness.

Sampling Dyestuffs

Question—I have had test dyeings made of the enclosed Direct Blue by outside parties, because I obtained such variable results, and now one dyeing is at least twice as strong as another of the same percentage. The baths always exhaust and no difference seems to be found if either slightly alkaline or acid. What becomes of the color in the weak dyeings?

Answer—The sample in question is composed of a concentrated Direct Blue in small bronzy granules reduced about 50% with fine salt. If the sample is put in a small bottle, so it can be observed, and tapped lightly on a table a few times you will notice that the salt works to the top and the concentrated dye goes to the bottom. This shows what may happen to a keg of the same dye while being carried over the city streets on a truck or to a sample envelope in the mail. We suggest a careful re-mixing of the entire lot and after sampling taking care that there is no further separation before testing. This same condition has been the cause of many controversies in dye tests and generally is to be found in mixtures or reduced dyes where one of the ingredients is in fine granular form. The essential for a test of any kind is a representative sample and, if the sample differs in any way from the lot sampled, an inaccurate test may be expected.

Navy Blue on Cotton

Question—I wish to dye a heavy Navy Blue on cotton yarn. The yarn is intended for upholstery goods and need not be fast to washing, but must be full and bright. None of the Direct Blues give me the brightness I need and whatever basic blues I have used are either uneven dyeing or crack in heavy shades.

Answer—Long ago, when the first aniline dyes were very expensive, the dyers aimed to use them mostly for topping their old-fashioned shades and now, in times of scarcity, we can often find many things of present interest in their old methods. Navy Blues can be made by preparing a tannin mordant, not with stainless sumac or tannic acid, but with dark colored sumac extract, preferably

Myrabolans extract, when it can be had. Instead of Antimony use Iron Liquor and the mordant will be of a dark grey color. On this dark colored bottom dye Methylene Blue, shaded redder, as necessary, with Methyl Violet. There is no difficulty in getting both depth and brilliancy, and on account of the smaller amount of dye in proportion to the mordant the color will be quite fast. There are also Indoine Blues now made. These dye more evenly from a bath containing Alum and Acetic Acid than they do on a regular Tannin-Antimony mordant and give full bright Navy Blues suitable for your purpose.

Primuline Deterioration

Question—What condition will cause a pure Primuline to develop into a dirty bluish red?

Answer—Generally the reason for this is the presence of Alpha Naphthol in the Beta Naphthol used in developing.

Columbia Black or Direct E Black Extra?

Question—Has Columbia Black FF any advantages over Direct Deep Black E extra or the American Direct Blacks of the same nature?

Answer—Columbia Black FF has the peculiar property of shading redder in the fuller shades. A pale grey dyed with it may match the Bayer or American Black but in a full black it is much redder and when a certain point is passed becomes a regular bronze color. On the other hand, it is faster to acids and is more reliable for pearls and greys as they do not change shade so readily. Columbia Black FF is well adapted to union goods in cases where the amount of cotton is small, while in cases where the cotton is in excess the danger is great of having it either too thin or else bronzy in tone.

Du Ponts Purchase Chicago River Frontage

In spite of large headlines in the daily papers as to the establishment of a big dye plant by the Du Pont Co. in Chicago, careful inquiry fails to confirm the re-

American Dyewood Co.

... *Manufacturers of* ...

Dyewood Extracts

Chipped and Ground Dyewoods

Importers of

Aniline Colors and Indigo

NEW YORK PHILADELPHIA BOSTON HAMILTON, ONT.

Works: CHESTER, PA.

port, at least as to any immediate action. The facts are that the E. I. Du Pont de Nemours Company has acquired title from Harrison Brothers & Co. to a tract of land, 300 by 170 feet, at the southeast corner of Mendell street and McLean Avenue, the deed naming a nominal consideration. The Harrison company now occupies several buildings on the property with its business. This property has about three hundred feet frontage on the Chicago river and is an ideal warehouse or factory location.

For several months there have been current reports to the effect that the parent corporation intended to construct a large dye manufacturing plant in this city, but no confirmation could be obtained from Mr. Fred Henderson, Chicago representative of Harrison's, Inc., who stated, however, that in all probability the property involved would eventually be improved with several new buildings for Harrison, Inc., but plans for the improvements are still in an indefinite state and it is not known just what the new buildings will comprise. He also stated that as far as he knew no plans are contemplated for the construction of a factory for the manufacture of dyes.

—*Paint, Oil and Drug Review.*

Federal Dyestuff Difficulties

According to the Boston News Bureau, default in interest in $2,000,000 Federal Dyestuff and Chemical Corporation 6 per cent. notes on Dec. 1 allows 30 days' grace for the two note holders' committees, controlling 85 per cent. of notes, to accept offer of representatives of Canadian Munitions Commission to operate Kingsport plant on rental basis of $20,000 monthly. Canadians demand that 51 per cent. of Federal Dyestuff stock be held in escrow for stated period of years, title to revert to them if successful in operating Kingsport plant.

Color Standardization in the Economy of Textiles

E. J. Redding of the Textile Color Card Association

At this particular time when our country is directing every effort to the conservation of man-power and materials, more attention should be paid to the economies to be effected by the use of standard colors. Judging by past standards the textile and allied trades of this country are today in a very fair shape so far as colors are concerned, but we must become more nearly perfect to obtain a greater degree of efficiency than has ever before been maintained either in this country or Europe, to help insure an early and successful termination of the war. Manufacturers of the more expensive fabrics catering as they do to a fashionable and wealthy public have felt that by putting out a wide range of shades they stimulated sales, for only in so doing could they hope to anticipate every whim and caprice of their patrons. A manufacturer in producing a fabric in a wide range of shades hoped but seldom expected to sell all of these shades, but was merely endeavoring to provide himself with those shades which the public would demand. What became of the unsalable shades, certain fabrics in the lighter colors could be re-dyed, thereby burdening the fabric with an excessive cost-wasting material and man-power, and such fabric after being re-dyed was invariably of inferior quality and commanded a lower selling price. Certain other fabrics could not be re-dyed, sometimes they were foisted on the public by means of a low selling price, often they were carried over for a season or more in the hope that the public taste would change, but invariably these, too, were sold at a great sacrifice.

In normal times it is possible to produce a wide range of shades, but with our present reduced supply of labor, materials and supplies it behooves us to produce most efficiently. The present conditions permit us to manufacture only such goods as will be absorbed in the coming season.

We know that in the woolen industry there is a shortage of both wool and machinery; even if we could secure an additional supply of wool so many of our looms are running on government work that we could supply but a small percentage of the normal civilian demand. This would seem to offer a particular opportunity for other industries, particularly the silk, to supply a very large part of women's dress goods apparel.

(*Continued on page* 9)

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Regarding Editorial Camouflage

Now comes the time of year when many trade papers bedeck themselves in a cloak of editorial camouflage and sallie forth in quest of advertising.

Certain editorials that were published during the year are now reproduced. The issue throbs with the intensity of its interest in you and your prosperity, *but* did you ever read an editorial that appeared at this time of the year which did not mention the name of the trade paper at least three times on every page? We all should be truly sorry for those editors who value so lightly the reasoning capabilities of their readers.

Allow
Me to
Extend to you
Royal greetings this new year and to say that
In the years to come I cannot
Conceive of anything finer than
An alliance of American Dye Manufacturers who
Need never fear the arms of trade from over the seas and...

May the true spirit of American Brotherhood
Assert itself in this industry and
Destroy the petty jealousies that hinder progress—and
Erect in America a permanent bulwark of endeavor, wholly.

Devoted to the upholding of true Americanism which
Yields not to the tinkle of easy-made gold and
Ever thru the grinding progress of the years be known for
Service, one to the other, and all for America.

—EDITOR

Many objects are attainable at this time if one would care to presume upon the spirit of the season. The refusal of certain Teutonic peace offers is proof of what one may expect if the reasoning power of the people is underestimated.

You cannot establish a trade paper on a pedestal of irreproachable conduct just by extending the season's good wishes.

The maintenance of any trade paper is dependent upon the revenue derived from its advertising pages, but you cannot make advertising the paramount issue.

In the past, too much attention has been paid to obtaining advertising and not enough to editorial policy and service.

This year has seen many mistakes in the careless placing of advertising and now as we enter the new year, this subject should receive very careful attention. When you do place advertising for the new year, make sure that the circulation is as represented. Remember that advertising is not a loss and consequently should be placed with utmost care and thought. The editorial strength of one particular issue is a poor guide by which to sum up a publication's editorial policy. If a trade paper is not wholly devoted to the interest of its readers no amount of editorial camouflage will enable it to survive.

One of the main objects of the proposed affiliation of American dyestuff manufacturers is the standardization of products. A manufacturer must meet the standard of the association before his product is recognized by them. Let us hope that before many months we may see a standardization of trade papers. When a trade paper says that it has such and such a circulation, let the association or each individual company demand actual proof. The future of the dyestuff industry is dependent upon coöperation. Coöperation is dependent upon the honesty of each manufacturer, consumer and every trade paper.

Color Standardization in the Economy of Textiles

(*Continued from page 7*)

We know that in some of the European countries the so-called luxury industries have been discouraged. We know that in this country, if our coal situation becomes acute, some of our less essential industries may be curtailed to give preference to others engaged in government work; some of our mills that might be affected are the sole support of entire towns and in one instance of a large city. We can avoid such a condition by exercising care in what we manufacture and in certain industries what we manufacture is largely a matter of what colors we manufacture.

Standardization of colors will do much to put our less essential industries on a firm basis, a basis that will enable them to be of economic value to the country by supplying fabrics to take the place of those being absorbed by the government and will prevent a loss and waste that would result were such industries to be suspended.

Prior to the war, American manufacturing conditions differed from those in Europe, Europe with its cheap labor was enabled to manufacture smaller quantities and wide varieties, this condition encouraged a wide color range and our manufactures, working under different conditions, felt called upon to duplicate such a color range, but now, due partly to changing conditions and partly to American initiative, our manufacturers are in a position to conduct their business along different lines.

In considering the economic advantages of standardized colors, it is to be remembered that it applies to manufacturers of textiles, manufacturers of garments and consuming public alike.

For color purposes it is possible to divide the spectrum into approximately three thousand shades. Now, let us consider two extremes; suppose manufacturers run one thousand shades, of course, there could be no standardization, each manufacturer will produce those shades that he thinks best, each retailer will purchase those shades which he thinks best, no two departments of a department store will carry the same shades. Even in a very staple color like navy blue, one manufacturer's conception of navy will have a greenish cast and another manufacturer's conception will have a purple cast, and it will be very difficult for a woman purchasing dress-goods materials to match the shade in the various accessories. Now, let us consider the other extreme; first, a line of about one hundred staple shades that never change, supplementing this, each season, a small line of most promising novelty shades, the season's indications also include those staple shades which promise best for the particular season, this would mean a line of but a few dozen shades each season. With our manufacturer confining himself to the same shades it would be possible then for the various department buyers of a store to purchase the same shades, the public would be able to match colors in all departments and the store would have less stock of unsalable colors to be sacrificed at the end of each season.

The garment trade is similar to the retail trade, with the fabric manufacturer running a thousand shades the garment man must purchase from a different manufacturer according to the colors he wants, in many cases he will have difficulty in matching one of those colors in accessories and some times, after going to considerable expense to match a shade in accessories, the fabric manufacturer may discontinue the difficult shade and the accessories will be valueless.

The greatest need of the retailer today, so far as some fabric departments are concerned, is a more compact stock, a smaller number of shades should be carried, far better to lose an occasional small sale than to risk a considerable loss for the sake of making a big display of colors.

There have been successful textile manufacturers who have had a "different" line of colors and who have felt that their success was due to that different line of colors, but a study of such colors leads one to the conclusion that their success was not as a result of their color range, but rather in spite of their color range, for it must be remembered that in a long run a manufacturer's success can but parallel his customer's success and his customer cannot successfully handle a color that cannot be duplicated in other fabrics.

The question arises how can colors best be standardized; the answer is furnished by the growing adoption of a standard color card in the United States. This card which originated shortly after the war in Europe was established with a view to accomplish the economies I have outlined.

The work of selecting colors is being continued by a committee of textile experts representing the various branches of the industry. The element of co-operation is one of its important features, the suggestions and forecasts of this committee improves the entire field of textiles.

A great saving could be made by a thorough study of the color proposition in the economy of textiles, this saving will affect every process of production, every purchase of finished material, every step in distribution and conserve material. It will simplify the labor question, save wasted energy and release idle capital. Its benefits will accrue to every one concerned with textiles. In the final analysis it will be a factor in furthering our national aims and as such well worthy of the attention of all you gentlemen.

The British Coal-Tar Industry and Its Difficulties in Time of War

C. M. Whittaker, B.Sc.

In giving a paper on the British coal-tar color industry, it is always necessary to explain at the outset that the present national circumstances prevent one entering into details which would be most interesting and illustrative of the present situation. These facts, which may not at present be given, will no doubt be given in due course, when they will redound to the credit of the British industry.

The British industry, founded by the discovery of Sir William Perkin in 1856, experienced a period of great prosperity in its early days, which was followed by a decline for a number of reasons, one of which, in my opinion, was that money was so easily made in the early days that the owners were content to rest on their oars and enjoy the fortunes they had secured. Though the coal-tar color industry had languished, it had never actually become extinct. It may, however, be asserted that the British industry had sunk to its lowest depths about the years

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1898-1900; but from then onward it commenced to recover, till in 1913 its competition had being increasingly felt by the German firms, which, just previous to the war, were subjecting the British firms to severe price-cutting campaign because the British competition in sulphur and direct cotton blacks was reducing to complete nullity the German conventions in those two classes of colors. This improvement had been brought about by enlightened management, which had gradually and unobtrusively been modernizing their works and their methods. Had not this revival taken place the task of building up an industry on a national scale would have been made infinitely more difficult, whilst the panic in the dyeing trades at the outbreak of war would have been gravely aggravated and would in all probability have jeopardized the dyeing of the clothing equipment required by the military authorities. The British firms were a considerable national asset at the outbreak of war; had these firms with their trained staffs and experience not been available, it would have gone much harder with color consumers. The fact that a private firm like Read Holliday & Sons, Ltd., were in a position to pay a dividend of 10 per cent. for the five years previous to the war, when they faced, unaided, the full weight of the German competition, shows that it was possible for a British firm to make a successful flight against the Germans. It is a favorable omen which is consistently ignored by those critics who are untiring in their gloomy forecasts of failure for the efforts presently being made in Great Britain — professional whimperers, as Professor Tilden termed them the other day.

[*The Lecturer then dealt with certain misapprehensions which have been current with regard to the British color manufacturing firms. It had been stated that the British firms had been much less generous and enterprising than the German firms in such matters as the matching of customers' patterns and the distribution of pattern cards.*

Controverting these statements, Mr. Whittaker said that for fifteen years he had been in charge of the experimental dyehouse of Messrs. Read Holliday & Sons, Ltd. (now British Dyes, Ltd.), during which period 50,000 patterns and samples had passed through the firm's books, and not one had ever been charged for. He also pointed out that this firm had introduced the Hydrosulphite Indigo vat from France into this country. A large number of pre-war pattern cards and circulars in various languages were shown.] *Mr. Whittaker proceeded as follows:*

Now let us examine the position at the outbreak of war as regards the coal-tar color industry in Great Britain. The principal firms engaged were:—The British Alizarine Co., which confined its products to Alizarin Orange, Alizarin Red, and Alizarin Blue—it is largely a co-operative company, as its shares are held for the most part by the large consumers of the above products; the Clayton Aniline Co., which had been absorbed by the Society of Chemical Industry, Basle, though it was located in Great Britain; Levinstein, Ltd., Manchester; Read Holliday & Sons, Ltd., Huddersfield. The two latter were limited companies, the majority of whose shares were held by the respective families.

The outbreak of war suddenly opened the eyes of the consumers of coal-tar colors in Great Britain to the disconcerting fact that they were largely dependent on Germany for their supplies; then ensued a panic which will ever be remembered by the staffs of the British firms, and which panic subjected them to an almost intolerable strain. The country soon realized that the manufacture of coal-tar colors was a pivot or key industry of the highest importance in which Germany held the dominating position, with Great Britain and Switzerland a long way behind. The realization of this fact was followed by a deluge of articles and correspondence containing the grossest mis-statements which appeared in the newspapers and journals, and were a source of no little amusement to the staffs of the British firms.

The cardinal facts of the situation, which were in danger of being lost amidst the controversy, were as follows:

In 1913 Great Britain imported coal-tar colors to the value of £1,946,224, representing 42 million pounds' weight of color, of which it was estimated £1,800,000 worth emanated from Germany. It must not, however, be assumed that all this quantity was consumed in Great

Britain, because a considerable quantity of color is bought here for shipment to India, Australasia, South America, and other countries. It is doubtful if much more than half a million of capital was employed in the British industry at the outbreak of war; so there you have the basic fact which faced the industry: how to replace an import of £1,800,000 by firms who did not control more than half a million capital. The task was economically and physically impossible of immediate execution in peace times; it was a hundredfold more impossible in the midst of the greatest war of all time.

The export value of German coal-tar colors throughout the world was, for the year 1913, £11,349,100; add to this the German home consumption at a generous estimate of £2,000,000, making a total turnover of £13,349,100. The capital of the German industry was £13,500,000 in 1913, showing that the annual production was approximately equal to the capital.

Another point is the supposed dependency of Germany on outside countries, particularly Great Britain, for many of the important raw materials of the coal-tar color industry. Such a state of dependency was no doubt existent in the earlier days of the industry; but the modern coke oven recovery plant has largely altered that state of affairs, as the following official figures for the year 1913 of the imports and exports of important raw materials connected with the German industry show. In considering these figures, I would ask you to bear in mind the fact that Germany's export represents the surplus after all the requirements of her home industry have been satisfied. Starting with benzol, toluol, etc., Germany exported 41,287,000 kilos, and imported only 6,709,600 kilos. These figures do not give much of an opening for crippling tactics. To these figures ought to be added 7,264,700 kilos aniline oil and salts exported by Germany against a negligible import of 156,100 kilos.

In 1913 Germany imported 4,155,200 kilos of carbolic acid, and exported 3,601,700 kilos, an adverse balance of, roughly, 500,000 kilos. It was well known by the tar distillers that the Bayer Co. were making an onslaught on the British market with synthetic carbolic acid, which would have effectively reduced the amount of pure carbolic acid distilled from coal-tar in this country. It must also be remembered that Germany will have made enormous quantities of synthetic carbolic acid during the war, so that under no combination of circumstances could its industry run short of carbolic acid after its experience of production during the war.

Passing on to naphthalene, Germany imported 5,248,700 kilos, and exported 6,151,110 kilos, in addition to 3,106,400 kilos of naphthols and naphthylamines. Again the balance is in her favor.

I now come to anthracene, of which Germany imported 1,286,100 kilos and exported 277,400 kilos. There the balance is decidedly against her, and it is the only important raw product for color manufacture in which Germany is deficient. It is the starting-point for alizarin and many of the most important vat colors, which latter have added so much to the prestige of the German firms. It must, however, be remembered that bromine enters largely into the constitution of many vat colors, which gives Ger-

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many an effective counter against the possible withholding of anthracene.

I now propose to pass on to the handicaps under which the British coal-tar color industry has been and is laboring.

The Achilles heel of the British industry was the fact that it had been in the habit of buying many of its intermediate products from the Continent. The result was that at the outbreak of war chemists had to work to replace these intermediate products, and suitable plant had to be erected which absorbed a large amount of energy without increasing the immediate output of color.

One of the greatest handicaps has been the shortage of chemists. On the outbreak of war I doubt if there were twenty British chemists who had had actual up-to-date experience in the manufacture of coal-tar colors on the commercial scale. Of those who had had experience, some had their energies diverted to the manufacture of explosives to the detriment of coal-tar color manufacture. It was an inevitable result of the close inter-relation between high explosives and coal-tar colors. No complaint is made of the diversion of this energy, but it requires to be stated as one of the definite handicaps of the industry during war time. There was no reservoir of trained chemists from which to draw, so that University trained men of good theoretical knowledge but no practical experience have had to be taken, and naturally some time must elapse before they become adapted to their new conditions. The outbreak of the war, bringing in its train the enormous demand for supplies of high explosives on a scale hitherto not contemplated, illustrated how closely inter-related was the manufacture of coal-tar colors and high explosives.

As everybody is aware, the two high explosives most largely in use are picric acid (or trinitrophenol) and trinitrotoluol. The latter requires similar apparatus to that which is used for making compounds like nitro-benzol, so essential in coal-tar color manufacture. The engineering trade has been so much occupied in connection with the supply of munitions that it has been difficult to get delivery of the plant for the necessary extensions. For the same reason there has been a shortage of the skilled fitters necessary for the erection of the plant and of men to erect the necessary buildings. In fact, the shortage of labor confronts one at every turn. The increases in the prices of copper and lead, which enter largely into the apparatus used in coal-tar color manufacture, have also added enormously to the cost of such plant.

The life-blood of the coal-tar color industry is sulphuric acid, fuming sulphuric acid, and nitric acid. It is the misfortune of color manufacture that it is impossible to make any color without the use of nitric and sulphuric acids, the latter being required in various strengths of fuming acid from 70 per cent. down to 20 per cent. SO_3 and D.O.V. These self-same acids are also indispensable for the manufacture of the two high explosives, lyddite and T.N.T. It is a matter which admits of no argument that the demand for acids for the manufacture of high explosives must take priority over their numerous industrial uses. In that fact you have the greatest handicap of the British coal-tar color industry, because, as is well known by every acid

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consumer, the supply of acids is nothing like equal to the demand.

Amongst the raw or primary products of the coal-tar color industry the four most important are benzol, toluol, naphthalene, and anthracene. The distribution of one of these products (viz., toluol) is controlled by the Government. The amount of toluol to be distilled from coal-tar has very definite limits, which are relatively small, so that the reason for this control is obvious. Benzol is the starting-point for the manufacture of synthetic carbolic acid, of which so much is being made at the present time owing to the demand far outstripping the production of carbolic acid distilled from coal-tar. This is being converted into picric acid. Benzol is also being used in large quantities for conversion into dinitrophenol, from which picric acid is also being manufactured.

Naphthalene and anthracene are free markets. The control of one of the chief primary products is, however, a heavy initial handicap on the output of coal-tar products.

Since the commencement of the war I have been in a specially favored position to diagnose what is passing in the minds of many color consumers. One common thought which is very prevalent is, "We can understand you not being able to make some of the German specialities such as Indanthrene, Alizarin Sapphirole, etc., nor do we expect you to do so immediately, but we cannot understand you not being able to supply such old colors as Bismarck brown, Benzopurpurine 4B, etc., the constitution and method of manufacture of which have been known for so many years." That is quite a reasonable attitude to adopt, and my paper will, I think, show completely the reason. Such colors are not being made freely at the present time, not through inability of British chemists to manufacture them, but owing to the fact that the necessary products are not available, since they are required for more important processes.

The surplus of benzol and toluol which is set free by the Government after all their requirements for explosive purposes have been met has a preferential call on it before it can be used for general color manufacture. Next to explosives it is the first duty of the British coal-tar industry to supply the various colors required for the varied equipments of the British, Colonial, and Allied Governments. People outside the trade have very little conception of the numerous colors required by the Government; they vary from mordant browns and sulphur blacks down to Methyl Violet for typewriter ribbons and Soluble Blue for ink for the Stationery Office. The huge demand for khaki uniforms required by the military authorities for the equipment of the troops caused a corresponding demand for mordant yellow, brown and green, blue or black. The demand at the outset for these colors was overwhelming. Mordant yellows were very scarce at the beginning, but the demand for these products has now been more than fully met. Seeing that salicylic acid is a constituent of all mordant yellows, and is in turn derived from carbolic acid, you will readily understand why it was scarce. Mordant browns never caused any difficulties, as the supply was and is more than sufficient to meet all requirements. The supply of mordant greens has also been very large. Sulphur yellows, browns, and blacks have also been sup-

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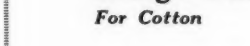

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plied in very large quantities by the British firms for the cotton equipment of the armies, such as cotton webbing, tropical uniforms, trench capes, ground sheets, mosquito nets, etc. Not only have all the British requirements been met, but large quantities of British-made dyes have been used in Australian, Canadian, Belgian, French, Russian, Italian, and Serbian equipments. I do not give these facts as a handicap on the British industry; rather is it intensely proud of its achievements in this direction under such difficult conditions; but I do put it forward as a definite reason why many colors have not been made which would otherwise have been made had not the energies of the British chemists been occupied in producing explosives and equipment colors.

[*The Lecturer here gave an interesting account of the products obtained from the four chief primary products of the coal-tar color industry—benzol, toluol, naphthalene, and anthracene—and mentioned that British Dyes, Ltd., had now a large oleum plant and a large nitric acid plant working successfully, and that the shortage of acids in this country is being rectified.*] *He then said:*

I now propose to show you what has been done by the British firms in the way of satisfying the requirements of the British and Allied Governments in equipment colors.

Those people who are constantly depreciating the efforts of the British firms seem conveniently to forget what has been accomplished in this direction, and never think of putting it down on the credit side of the account.

You may have seen in the scare Press that the dyes being supplied by the British firms were not anything like as good as those of the German firms; but I wish to state most emphatically that khaki uniforms dyed with mordant yellow, brown and green of British manufacture are just as fast to light, exposure, and wear as any similar cloth that was previously delivered to the British Government dyed with German colors. The British firms have reason to be proud of their products for this purpose, and the day when it is necessary to stipulate German colors in British khaki specifications is past.

At the top of the khaki boom, when the military authorities were putting extreme pressure on the manufactures for delivery, one British firm alone delivered 145,000 lbs. weight of khaki wool dyestuffs in the month of December, 1915. That was a noteworthy effort of which the firm in question was particularly proud, yet according to our critics we ought to stand in sackcloth and ashes and confess our incompetence. Do you wonder that we refuse to do so? Let people contemplate what the manufacture of that large weight of color meant; then they will realize what British firms have done; why other colors were in short supply.

A large quantity of mordant green was supplied by British firms for dyeing the uniforms of the Italian army. Large quantities of mordant yellow, brown and green of British manufacture are at the present time being used in the uniform cloth of the Russian army now being made in Great Britain. I show you the two Russian shades here—a red shade and a green shade. Here you have three colors which have been supplied by British firms in huge quantities for the cotton equipments required by the authorities, such as tropical uniforms, cotton webbing, ground sheets, mosquito nets, etc. The British army is admittedly the best-equipped army in the field to-day. Are the British color firms to be denied their share of the credit for this pleasing result? When you see at the various railway stations the soldiers coming home on leave, with the mud of the trenches thick upon them, showing under what severe conditions they have been fighting, do their uniforms and equipment look badly faded? They do not, but they are still a good khaki, showing that the British-made colors are not incapable of withstanding the severest war conditions.

Few people have a true conception of the amount of preliminary work which has to be carried out in the manufacture of a coal-tar color. A direct cotton black, which in its manufacture has involved twenty-one distinct chemical operations, is nevertheless known in the dyeing trade as a common black. The amount of preliminary and intermediate work which has to be done before a color can actually be produced from coal-tar is very large; it is the amount of this preliminary work which makes the progress appear so slow to those people who have no conception of the detail work in color making.

(*Continued in next issue*)

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